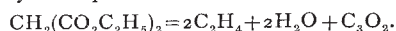


## A NEW OXIDE OF CARBON.

THE current number of the *Berichte der deutschen chemischen Gesellschaft* (1906, xxxix., p. 689) contains a preliminary communication by Messrs. Otto Diels and Bertram Wolf, of the Berlin University, giving an account of the preparation and properties of a new oxide of carbon having the composition  $C_3O_2$ , for which they propose the name *carbon suboxide*. The new oxide is obtained from ethyl malonate,  $CH_2(CO_2C_2H_5)_2$ , by subjecting the vapour of the latter to the action of phosphorus pentoxide at  $300^\circ$ ; under these conditions two molecules of water are removed by the action of the latter reagent, and a mixture of ethylene and carbon suboxide formed, the reaction being expressed by the equation



The ethylene and carbon suboxide are condensed together in a receiver cooled with liquid air, and subsequently separated by fractional distillation.

Carbon suboxide is a gas at the ordinary temperature, which burns in the air with a smoky flame, has a most penetrating smell, resembling that of acrolein and mustard oil, and attacks the eyes, nose, and respiratory organs violently. On cooling it condenses to a colourless, highly refractive liquid, which boils at  $7^\circ$  under 761 mm. pressure. The results of the analysis and of the determination of the vapour density show that the molecular formula is  $C_3O_2$ .

Carbon suboxide at once combines with water, re-forming malonic acid, and also unites with ammonia, hydrogen chloride, and aniline, forming malonamide, malonyl chloride, and malonanilide respectively; it therefore contains the chain of carbon atoms previously existing in the malonic acid derivative from which it is prepared, and in all probability possesses the constitution represented by the formula  $OC:C:CO$ . Hence in both its constitution and properties it has a close analogy with the metallic carbonyl derivatives, and especially with Mond, Langer, and Quincke's nickel tetracarbonyl,  $Ni(CO)_4$ .

When the liquid suboxide is sealed in glass tubes it slowly undergoes change at the ordinary temperature, and is finally converted into a dark red solid, which dissolves in cold water, yielding an intense eosin-red solution. At higher temperatures the alteration takes place much more rapidly, and the product is then no longer completely soluble in water. The nature of the changes here taking place is still under investigation.

## UNIVERSITY AND EDUCATIONAL INTELLIGENCE.

CAMBRIDGE.—One hundred and fifty-five students have entered for the First Part of the natural sciences tripos and twenty-five for the Second Part in the coming June. In the mechanical sciences tripos there are fifty candidates. These figures show a considerable increase in the numbers for the last few years. There are seventy-seven in for the First Part of the mathematical tripos, and seven entered for the Second Part.

The Vice-Chancellor has announced that the Girdlers' Company has offered to renew, for a further period of three years, its grant of 100*l.* a year towards the study of economics in Cambridge.

The General Board of Studies has approved for the degree of doctor in science Mr. F. W. Keeble, Gonville and Caius College.

The Special Board for Physics and Chemistry has agreed to expend its share of the Gordon Wigan Fund as follows:—(1) A sum of 50*l.* per annum is to be granted to the department of chemistry for five years for the establishment of a prize or otherwise for the encouragement of research in chemistry. (2) The balance of the income is to be used for the assistance of research and teaching amongst the departments of the University directly connected with the Board, other than that of chemistry, it being understood that on the average the departments should share equally. (3) Applications for grants are to be made by the heads of departments and be considered at a meeting of the Special Board held not later than the

division of the Michaelmas term in each year. Grants not exceeding 74*l.* have been made out of the balance on income account for 1905 to the departments of physics and mineralogy to defray the cost of special apparatus.

It is reported from Berlin that Mr. Alfred Beit has presented 100,000*l.* to Hamburg for the establishment of a university.

THE Goldsmiths' Company has made a grant of 1000*l.* to the building and endowment scheme for Bedford College, University of London. The Grocers' Company has granted 25*l.* for the same purpose.

THE Goldsmiths' Company has made a grant of 10,000*l.* to the Institute of Medical Sciences Fund, University of London, on the assumption that a site will be provided for the institute at South Kensington.

PRESIDENT THOMAS, of Bryn Mawr College, has announced, says *Science*, a gift of 16,000*l.* from Mr. John D. Rockefeller, to enable the college to meet the expenses incurred by the trustees over and above the gift of 50,000*l.* in 1902 for the new library. Mr. Rockefeller has contributed in all 91,000*l.* to the college. From the same source we learn that McGill University will receive 10,000*l.* from the estate of the late Mr. Edwin H. King, former general manager of the Bank of Montreal.

MR. F. C. FORTH, principal of the Municipal Technical Institute, and director of technical instruction for Belfast, has compiled a very useful "Student's Guide to Prizes and Scholarships." The guide is primarily intended for the information of present and future students of the institute over which the compiler presides, but, as it contains details of scholarships at universities and other institutions of higher education, it should appeal to a wide circle of students elsewhere. The guide demonstrates in a convincing manner the numerous facilities in existence to assist earnest students of slender means to continue their education so far as their abilities allow.

MR. WYNDHAM, M.P., delivered an address at the distribution, on March 3, of prizes won by the students of the Dover municipal schools of science, art, and technology. He said the study of science is the study of truth. The pursuit of science is not beset by those pitfalls which are now called "terminological inexactitudes." In science, if the cause is known the effect can be foretold; it is the only safe form of prophecy. The pursuit of pure science is the noblest calling to which earnest endeavours can be given. The present age is preeminently the age of science, and all who study it feel they are comrades in the great quest for truth. The pursuit of science has brought in its train gifts of various kinds, and to the worker in technology it has brought perhaps the greatest gift that anyone can obtain—the gift of independence, not only pecuniary independence, but the gift to men and women of an ample field for their own energy in which they can win distinction, and at any rate justify their existence upon earth.

ON February 28, in the presence of a large and representative gathering of agriculturists, representatives of county councils, the Scotch Education Department, and others interested in agricultural education, Lord Balfour of Burleigh formally opened the new buildings of the Edinburgh and East of Scotland College of Agriculture. The new buildings, situate in George Square, Edinburgh, consist of well equipped chemical, botanical, and bacteriological laboratories and lecture-rooms, and class-rooms for the various other subjects which form part of the college course. Adequate provision is also made for the staff of lecturers engaged in extension work in the counties. The cost of the present scheme has amounted to more than 9000*l.*, and has been almost entirely met by grants from the Scotch Education Department, the Carnegie Trust, the Highland and Agricultural Society, and subscriptions from landowners and farmers. In the course of an interesting address, Lord Balfour referred with satisfaction to the improved relations which now exist between the farmer and those engaged in the work of agricultural education and in the application of the various sciences to the investigation of agricultural problems.

THE Education Committee of the London County Council has issued a report, drawn up by a subcommittee, dealing with the question of apprenticeship. A carefully thought out scheme of scholarships for particular cases is, the report states, the only effective, as well as the only legal, substitute for the old-fashioned apprenticeship premium within the reach of a local authority. The report shows that there are in London various apprenticeship charities with an aggregate income of 24,000*l.* a year, and not more than one-third of this sum has been expended in the payment of premiums. It is suggested that these funds might with advantage be devoted to technical scholarships for poorer children in higher elementary schools, or to the maintenance of boys while they are attending day technical instruction, and thus unable to earn wages. Attention is directed in the report to the lack of technical training in London, and the subcommittee urges that if the apprenticeship system is destined to disappear, it is necessary to find a substitute for such training. Scholarships tenable at evening classes, industrial scholarships at day technical classes, and at trade schools, and the part-time system by which the boy or girl spends a portion of the day in the workshop and the remainder in a day technical school, are mentioned as ways of training which will take the place of the old indentured apprenticeships.

THE scheme of training urged upon the London County Council by its Education Committee as a substitute for the apprenticeship may be summarised briefly as follows:—The intelligent boy, as he leaves the elementary school, will have offered him the choice of two courses of instruction which will assure him an all-round training in a skilled trade. There will be, first, the "part-time" system, in which he will spend a portion of the week in the workshops and the remainder in the day technical school, and, secondly, there will be evening classes. In certain cases scholarships carrying free tuition and a maintenance grant will be awarded to the day students to compensate for the small earnings received during the years of training. Other scholarships of less value will be allowed to some of the evening students in order to encourage regularity of attendance. From this class of student will be drawn the skilled worker of the future. The boy, as he leaves the higher elementary school, will be able to enter the day trade school, either by paying the fees himself or by winning one of the trade scholarships. With this stream of boys coming from the higher elementary school will mingle another stream of boys who, having completed their course at the secondary school, have competed for one of the trade scholarships. From this class of student will be drawn the future foremen and managers of industrial undertakings. Finally, a development of the senior County Council scholarships will make it possible, not only for intermediate scholars, but also for certain of the holders of trade scholarships, to proceed, for the highest technological instruction in the engineering, electrical, chemical, or other industries, to the university. From these will be drawn, we may hope, the future inventor, the future managers of large businesses, and the future "captains of industry." A somewhat less elaborate system will afford similar facilities for girls.

THE science laboratories and class-rooms at Dulwich College have long been inadequate for the demands made on them. The governors of the school, with their chairman, Lord Davey, have now, owing to the cooperation of the Estates Governors with the Charity Commissioners and the Board of Education, been able to commence the building of a new science school, the foundation-stone of which was laid with due ceremony on Saturday last by Lord Rayleigh, P.R.S. The school is to consist of two floors, the upper for chemistry, providing an advanced laboratory, a large combined lecture-room and laboratory, a junior laboratory, a separate lecture-room with preparation store, and balance rooms; the lower for physical science, and containing a senior and junior laboratory, two lecture-rooms, and a school museum. Provision is also made for a master's room, a photographic dark-room, and a small workshop. The building is being erected from the plans of the school architect, Mr. C. E. Barry. In his speech in the great hall Lord Rayleigh contrasted the old and present position of science in schools. He pointed out that scientific

spirit and method should be the aim of the teaching. In the present-day provision of elaborate apparatus and fittings things were in danger of being made too mechanical. He mentioned the simple apparatus used by Maxwell, and by Hughes for the microphone, who carried simplicity almost to an absurdity. The charms of accurate measurement were briefly touched upon. He thought there was also a tendency to try and cover too much ground in science teaching at schools; less, more thoroughly done, would be better. His own classical education was not literary enough; he was taught no English composition. Modern languages would be better than Greek for very many boys.

THE London Inter-collegiate Scholarships Board was constituted in 1904 with the approval of the governing bodies of University College, King's College, and the East London College, for the purpose of holding a combined annual examination for entrance scholarships and exhibitions tenable at those colleges. One examination has been held already, and with satisfactory results. The next examination will take place in London on May 15 and following days. The competition is limited to those who have not previously been students at any one of the colleges, except where the contrary is stated. No candidate will be admitted to the examination unless he has passed the matriculation examination of the London University, or any examination accepted by the University in lieu thereof, or is the holder of a school leaving certificate, or is able to furnish some evidence of having had a sound general education which is satisfactory to the Board. Application should be made to the secretary of the Board, University College, London, Gower Street, W.C., for forms of entry, which must be returned not later than May 1. Any scheme tending to diminish the number of examinations to which pupils in secondary schools are subjected is to be welcomed, and we trust that the schoolmasters of London will appreciate the efforts of this Board. The insistence upon the possession of a good general secondary education by the holders of scholarships at the group of colleges concerned is a step in the right direction, and it is to be hoped this example will be copied by similar institutions throughout the country.

## SOCIETIES AND ACADEMIES.

LONDON.

Royal Society, March 2, 1905.—"On the Electric Resistance to the Motion of a Charged Conducting Sphere in Free Space or in a Field of Force." By G. W. Walker. Communicated by Prof. A. E. H. Love, F.R.S.

November 16, 1905.—"First Photographs of the Canals of Mars." By Prof. Percival Lowell, Flagstaff Observatory, Arizona. Communicated by Sir Norman Lockyer, K.C.B., F.R.S.

With this paper the author communicates a number of photographs which undeniably prove the objective reality of the Martian canals. From a large number of photographs obtained by Mr. Lampland during May and June, 1905, five have been selected for publication, and when these are studied with the contemporaneous, yet quite independent, drawings made by Prof. Lowell, the more prominent canaliform features on the Martian disc are plainly seen.

The photographs show, so far as the grain of the photographic plate permits, that the canals are narrow and direct lines following arcs of great circles or curving in a systematic manner. There is evidence, although for the present the author does not care to assert it definitely, that both a double canal and a double oasis have been photographed.

One remarkable result that has accrued from Mr. Lampland's researches is the increased efficiency to be obtained by diaphragming down the objective, so that its effective aperture becomes equal to, or less than, the length of the atmospheric waves obtaining at the moment of observation. If the aperture is so large that more than one such wave is in front of the objective at the moment of exposure, poor definition results, caused by the consequent quiver in the rays from the planet; but if only one wave be included, the atmospheric displacement of all the rays is homogeneous, and good definition results.